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Recurrent Sternal Dehiscence and Total Sternal Erosion Following CABG: Successful Reconstruction Using Bilateral Robicsek Wiring and Plate–Screw Fixation

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Case Report

Keywords: Sternal dehiscence, Robicsek technique, plate fixation, sternal erosion, CABG complication

Posted Date: November 12th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10475745/v1

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Additional Declarations: No competing interests reported.

Abstract

Background

Sternal wound complications after median sternotomy remain a serious source of morbidity despite advances in surgical techniques.

Case Report:

A 64-year-old male with hypertension and a history of smoking underwent elective two-vessel coronary artery bypass grafting (CABGx2) on August 7, 2024. The patient was discharged on postoperative day 7. One month later, he presented with sternal wound dehiscence and was taken for revision surgery. The previous wires were removed, and sternal fixation was achieved using a titanium plate-screw system. Despite initial stabilization, recurrent wound dehiscence occurred on postoperative day 5, and vacuum-assisted closure (VAC) therapy was continued until October 10, 2024. Owing to persistent instability and wound breakdown, a second revision was performed. Intraoperatively, the sternum was found to be completely eroded. Bilateral Robicsek wiring was applied to approximate the costal margins, bridging the sternal defect. Additional stabilization was achieved by extending plate-screw fixation to the intercostal junctions. The mediastinum was drained, the subcutaneous layer was closed with continuous Vicryl sutures, and the skin was closed with Prolene in a matrix fashion. One-month follow-up demonstrated a clean wound with complete healing and preserved thoracic stability.

Conclusion

In patients with total sternal erosion and failure of VAC therapy, combined bilateral Robicsek wiring and plate-screw fixation provides a durable and anatomically sound reconstruction.

Introduction

Post-sternotomy sternal dehiscence is a rare yet severe complication following cardiac surgery, with an incidence of 0.5–2%.[1,2]

Risk factors include diabetes, obesity, chronic obstructive pulmonary disease, smoking, and prolonged mechanical ventilation.[3] Recurrent dehiscence or total sternal loss poses a reconstructive challenge, often requiring rigid fixation and tissue coverage.

This case describes a patient with complete sternal erosion after CABG successfully treated using bilateral Robicsek wiring combined with plate-screw fixation—an approach consistent with current AATS and STS recommendations for advanced sternal wound management.[4]

Case Presentation

A 64-year-old male with hypertension and active smoking history underwent CABGx2 on August 7, 2024. Postoperative recovery was uneventful, and he was discharged on postoperative day 7 (Fig. 1).

On September 7, 2024, he presented with wound dehiscence and sternal instability. Revision surgery was performed: the previous steel wires were removed, and rigid sternal fixation using a titanium plate-screw system was achieved (Fig. 2). The mediastinum was drained, and the wound was closed primarily.

On postoperative day 5, recurrent wound breakdown was observed. VAC therapy was initiated and continued until October 10, 2024, but no improvement was noted. The patient underwent a second revision on October 10, 2024. Intraoperatively, the sternum was completely eroded (Fig. 3). Bilateral Robicsek wiring was applied, with the costal margins approximated and anchored using steel wires (Fig. 4). To enhance rigidity, the chest wall was further stabilized with three titanium plates fixed bilaterally to the ribs (Fig. 5). The mediastinum was drained, the subcutaneous layer was closed with continuous Vicryl sutures, and the skin was closed with Prolene in a matrix fashion.

At 1-month follow-up, the wound was clean, sutures were removed, and chest X-ray showed preserved chest wall integrity and stable fixation (Fig. 6).

Discussion

Sternal wound dehiscence can progress to mediastinitis and life-threatening sepsis if inadequately treated.[5] Traditional wire closure may fail in patients with poor bone quality or infection. Current European and North American guidelines recommend rigid plate fixation and/or muscle flap reconstruction for extensive sternal instability.[4,6]

The Robicsek technique, originally described in 1977, reinforces the sternum by anchoring stainless steel wires around the costal cartilages. When combined with modern plating systems, this hybrid construct provides both mechanical strength and physiological chest wall motion.[7]

VAC therapy remains first-line for superficial infections; however, persistent instability, as in this case, warrants definitive reconstruction.[8]

Our approach—bilateral Robicsek wiring with plate fixation—restored chest stability without need for muscle flaps, consistent with recent reports emphasizing early rigid reconstruction to improve outcomes and reduce infection recurrence.[9]

At follow-up, the patient had no recurrence or instability, highlighting the durability of this method in advanced sternal erosion.

Conclusion

In cases of total sternal erosion and failure of conservative management, combining bilateral Robicsek wiring with titanium plate-screw fixation represents a reliable and effective reconstructive strategy. This

approach provides rigid stabilization, preserves thoracic geometry, and reduces the risk of recurrent dehiscence.

Declarations

Conflict of Interest:

The author declare that there is no conflict of interest.

Patient Consent:

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Author Contribution

A.D.WritingConceptEditingLanguage Correction

Acknowledgement

none

Data Availability

The datasets generated and/or analyzed during the current study are not publicly available due to patient privacy and confidentiality restrictions but may be available from the corresponding author upon reasonable request and subject to institutional approval.

References

1. Robicsek F, et al. The prevention and treatment of sternum separation following open-heart surgery. J Thorac Cardiovasc Surg. 1977;73:267–8.
2. Losanoff JE, et al. Sternal stabilization after median sternotomy: review of methods and recommendations. Ann Thorac Surg. 2002;73:1060–6.
3. Raman J, et al. Sternal closure with titanium plate fixation—a paradigm shift in preventing mediastinitis. Interact Cardiovasc Thorac Surg. 2012;14:757–61.
4. Lazar HL, et al. Prevention and management of sternal wound infections. Ann Thorac Surg. 2020;110:1536–44.

5. Raja SG, et al. Sternal wound reconstruction: current practice and evidence. Eur J Cardiothorac Surg. 2022;61:1273–83.
6. Society of Thoracic Surgeons (STS). Clinical practice guidelines for the prevention and management of mediastinitis after cardiac surgery. Ann Thorac Surg. 2021;111:989–1003.
7. Demos DS, et al. Hybrid sternal reconstruction using Robicsek technique with plating. EJVES Short Rep. 2023;60:102–6.
8. Schimmer C, et al. Management of deep sternal wound infection: vacuum-assisted closure and rigid fixation. Eur J Cardiothorac Surg. 2020;57:349–56.
9. D'Cunha J, et al. Early rigid reconstruction for complex sternal dehiscence improves outcomes. EJVES. 2024;78:453–60.

Figures

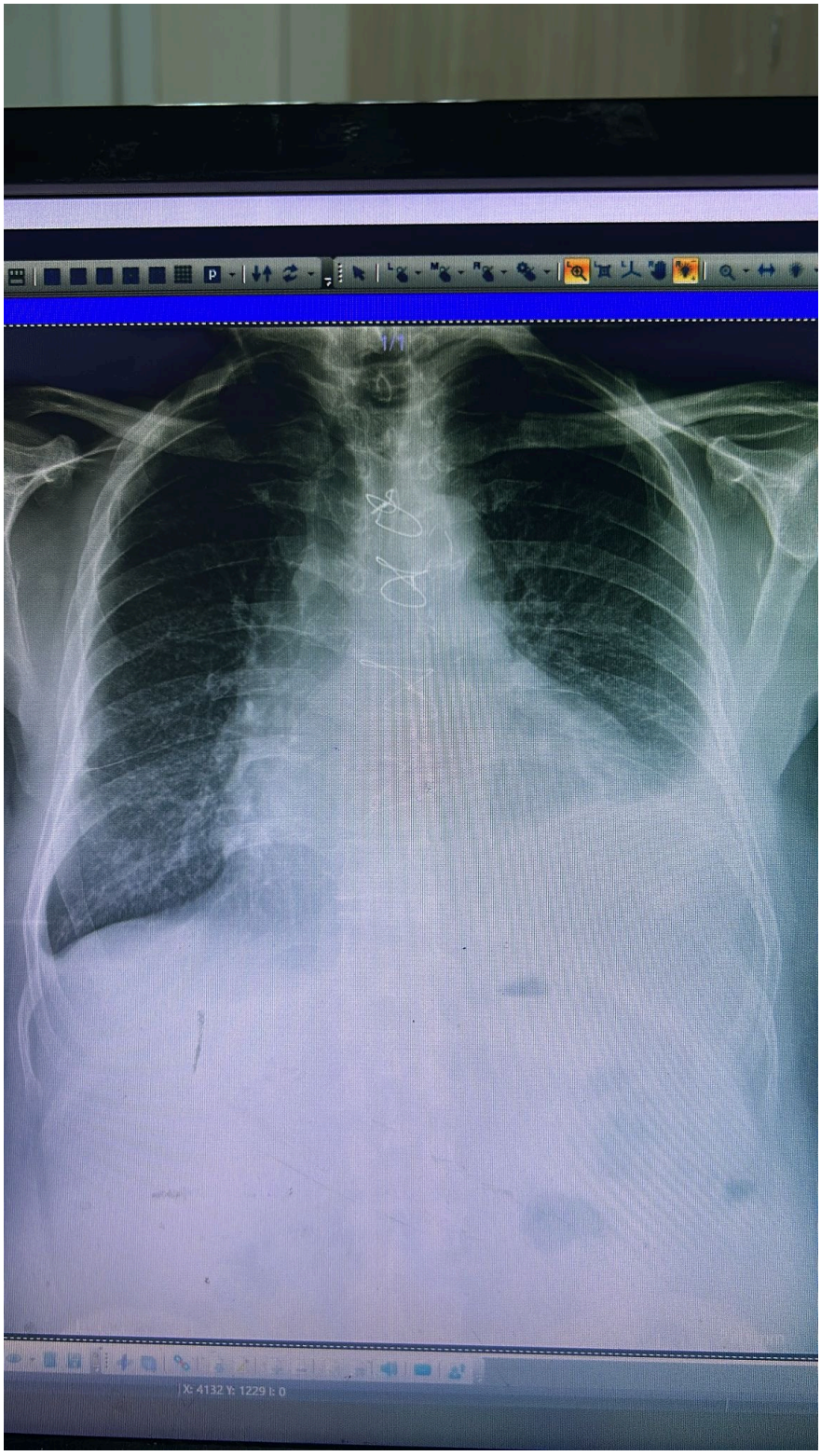


Figure 1

Post-CABG chest radiograph demonstrating primary sternal wire closure.

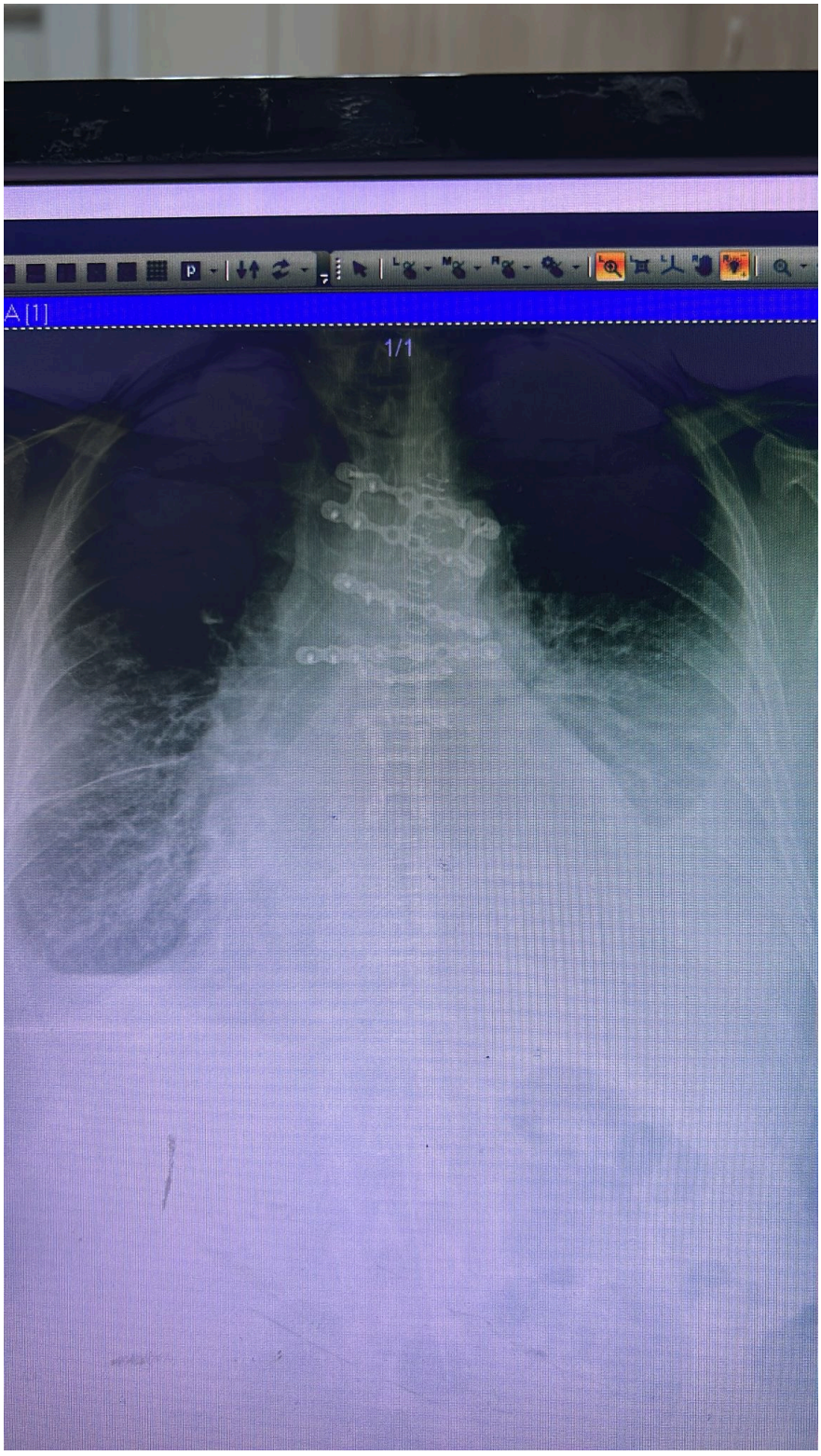


Figure 2

Post-first revision chest X-ray showing titanium plate-screw fixation.

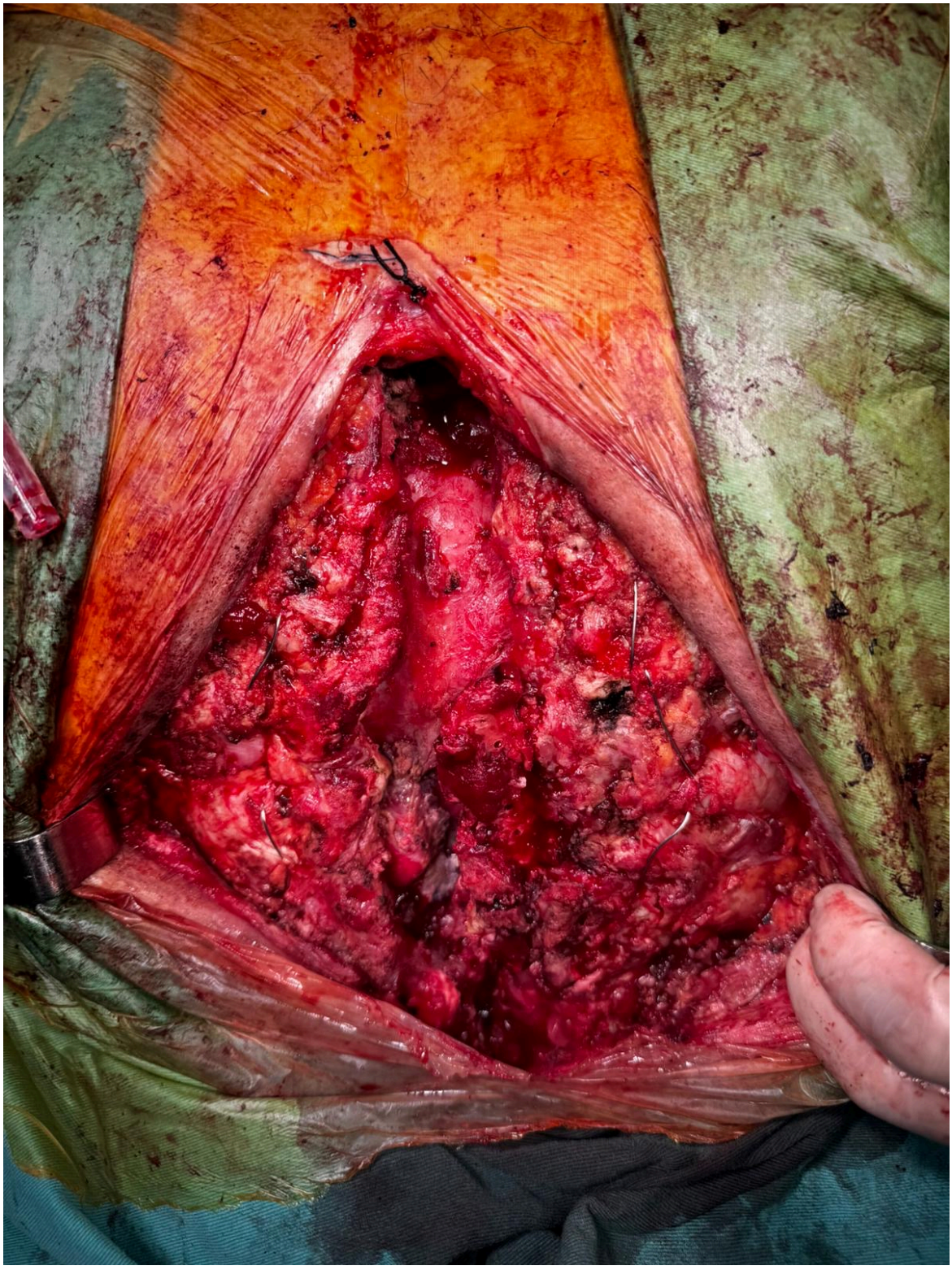


Figure 3

Intraoperative image showing complete sternal erosion and debridement before reconstruction.



Figure 4

Bilateral costal margins approximated using Robicsek wiring to restore thoracic continuity.



Figure 5

Final intraoperative view demonstrating reinforced chest wall with multiple titanium plates.

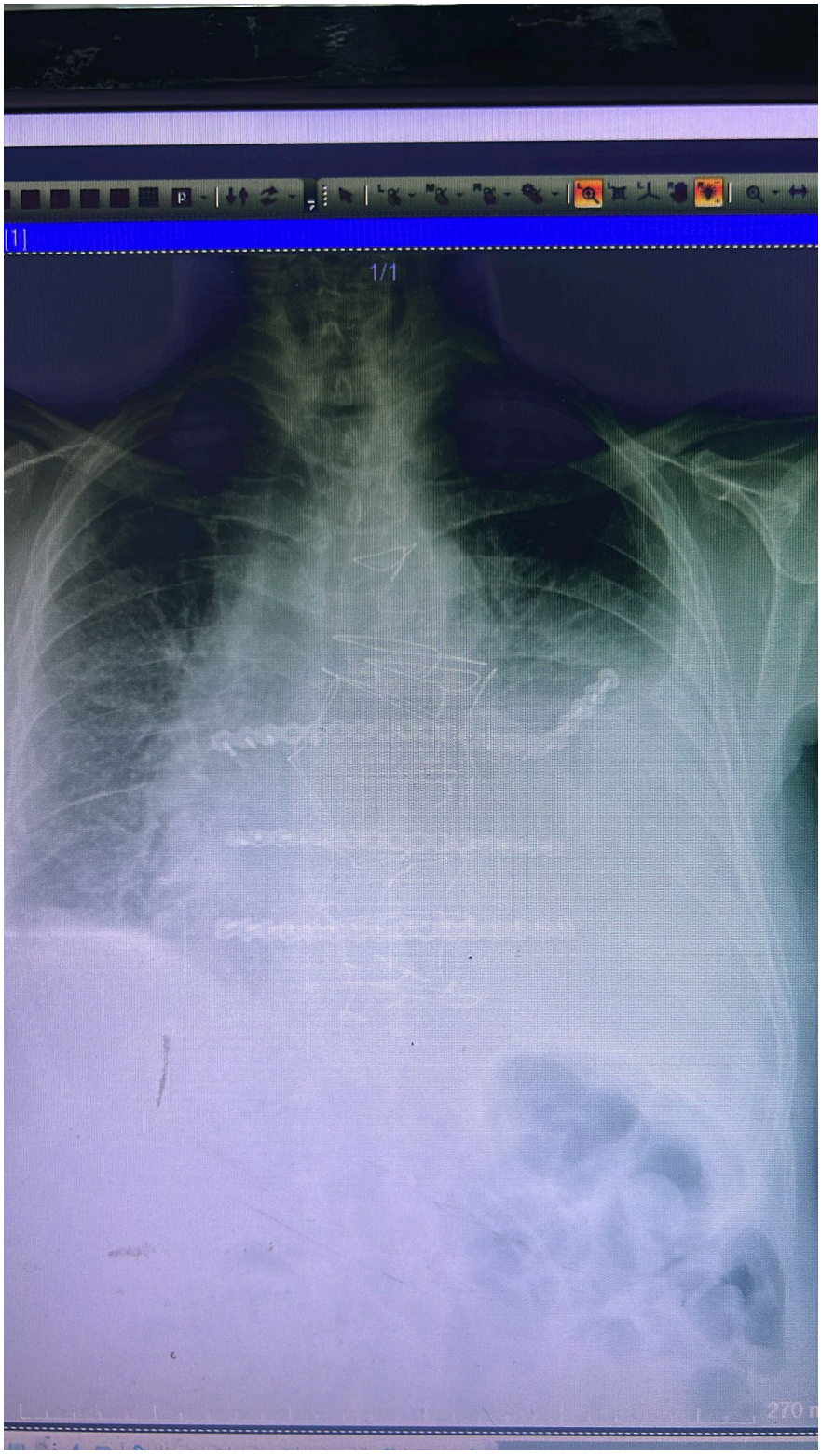


Figure 6

One-month postoperative chest X-ray confirming stable fixation and wound healing.